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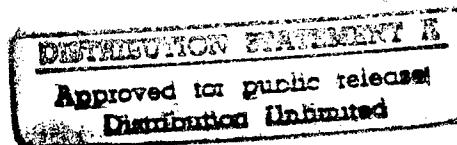
AFFILIATES OF THE ACADEMY OF SCIENCES USSR

- USSR -

by M. K. Grave and Ya. G. Goroshchenko

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AFFILIATES OF THE ACADEMY OF SCIENCES USSR

The following are translations of two articles appearing in Izvestiya Karel'skogo i Kol'skogo Filialov Akademii Nauk SSSR (News of the Karel' and Kola Affiliates of the Academy of Sciences USSR) No. 4, 1959, pages 157-158 and 158-159, respectively.

In the Karel' Affiliate of the
Academy of Sciences USSR

-by M. K. Grave-

During the summer of 1959, expeditionary detachments of the departments of regional geology, mineralogy and petrography worked in the various regions of the Republic.

Field work was carried out last year on two subjects: "The geology and petrography of the Yelet'ozerskiy mountain mass in connection with its mineralization" and "The carbonaceous rocks of Central and Northern Karel'." Materials were gathered which made it possible to commence the generalization and writing of monographs resulting from many years of research. One of the sections of the subject on carbonaceous rocks was the study of algae from Proterozoic deposits. New materials, which were gathered in a number of regions of Southern Karel', are enriching the available data on the paleontology of Proterozoic rocks.

Expeditionary work was first carried out on the study of ore minerals in the quaternary deposits of the Onego-Serozerskiy watershed. A geological survey (SZGU) has discovered the presence of scheelite and other minerals in schlichks. The purpose of the assignment was the establishment of ways for the transfer of these minerals and their connection with the geomorphology of the region and the original bedrock formation complexes.

The study of the geology and of the rare metal mineralization of the Kostomuksheskiy ferrous ore beds was continued. Special attention was devoted to the exploration of rare metals in these beds.

Research work was continued in Northern Karel' and in the western part of the Sokoloozerskiy mountain mass on the Proterozoic granites, for the purpose of studying the inner structure of the massif and its correlation with the enclosing masses. Also metallometric explorations were made in order to ascertain the possible rare metal mineralization.

Technical and economic exploration was carried out on beds of stone-forming materials in the Sortaval'skiy and Medvezh'yegorskiy Rayons for the purpose of elucidating their utilization in the immediate future. Beds of gneissic granites in the region of the city of Pitkyarant were recommended as a site for the construction of a crushing plant.

Several expeditionary detachments were formed at the Institute of Biology. Zoologists together with parasitologists made trips to the Medvezh'yegorskiy, Sortaval'skiy, Kondonozhskiy, Suoyarskiy and Kaleval'skiy Rayons. They worked on the subject: "The biological role of mouselike rodents and other vertebrate animals in the formation of natural nuclei and the spread of transmissible diseases on the territory of Karel' and the developments of measures to combat the latter." The basic purpose of this research was the detection, study and suppression of the encephalitis of mites and ticks and of tularemia. A detachment of zoologists and parasitologists went in the autumn to Murmanskaia Oblast to continue working on the same project.

The parasitologists also worked on the Kuyto lakes in the region of Kaleval'skiy Rayon of the Karelism SSR and on the White Sea. They were engaged in the study of diseases of fish and of plankton-feeding birds.

The three-month expedition into Kemskiy Rayon was devoted to the scientific development of natural grounds and the rational organization of reindeer breeding in the Karel'.

Ichthyologists and hydrobiologists of the zoology section have carried out research in the Syamozerskiy group of lakes. The purpose of their work was the formulation of the biologic and economic improvement of the ichthyofauna and the increase of fish productivity in a number of lakes in that group.

The newly organized laboratory of feed resources has carried out the first expeditionary project of the section, "Research in the flora of shallow lakes which are fit for feeding and swimming grounds for domestic ducks." It explored Lake Lormo, near the city of Petrozavodsk, the bays and sounds of Lake Ladoga in the environs of the Salmy hamlet, Lunkulunsaari and Mantusaari islands, and a number of lakes in Pryazhinskij and Olonetskij Rayons.

A regular scientific coordinating conference of the Oceanographic Commission of the Academy of Sciences USSR on the dynamics of sea coasts and water reservoirs took place between 22 and 26 September 1959, in Odessa.

Representatives of the institutes and affiliates of the Academy of Sciences USSR; of the Academies of Science of Union Republics, of higher educational institutions (VUZ), builders and operators, workers of the various sovnarkhozs, departments and ministries took part in the conference. Scientists of the German Democratic Republic and of the Polish Peoples' Republic also participated in the work of the conference.

Reports and announcements presented by 40 organizations were published before the opening of the conference.¹ These materials embrace the following sections: general problems of the dynamics of banks of lakes and of water reservoirs, methods for the prognosis of physicogeological phenomena at water reservoirs, experiments in their exploitation and observation, and problems of the methods of observation. A part of the reports is devoted to the problems of the dynamics of sea coasts and the protection of the shores against destruction.

The participants in the conference made a number of critical remarks on the review reports at section meetings and on their wish for improvement in the coordination of work and information during the period between conferences.

Interest was shown in the informative report on the work of the department of hydrology of the Karel' Affiliate of the Academy of Sciences USSR on the geomorphology of lakes, the study of the genesis of lake craters and the classification of the shores of the lakes of the Karel' region; on the establishment of underwater research with the aid of sounding devices and diving equipment, as well as on the deductions from the observations of hydromorphologic processes in lake basins.

The conference pointed out the need for a comprehensive study, including diving explorations, of the water reservoirs of the various zones of the USSR.

Informative announcements on the work of Soviet engineers in China and Ceylon were heard at the close of the conference.

Excursions along the Odessa coast of the Black Sea

¹Proceedings of the conference on the dynamics of sea coasts and water reservoirs, Vol. 1, Odessa, 1959

to the Kakhovskoye water reservoir were organized for participants in the conference. They also inspected the American hydrographic war vessel "Maury" which paid a visit to the Black Sea people.

The next conference is scheduled to take place in Kuybyshev in September 1961.

In the Kola Affiliate of the Academy of Sciences USSR

-by Ya. G. Goroshchenko-

The expeditionary scientific and exploratory work of the Geological Institute of the Kola Affiliate of the Academy of Sciences USSR conducted in the summer of 1959 has been completed.

Twenty field teams of the Institute have worked in the various regions of Kola Peninsula during the current year. Research was carried out on the basic problem of the Geological Institute: "Regularity of spacing of the most useful ores of Murmanskaya Oblast as a basis for their prognosis and location." This year's research has been noted for its complexity. Thus, several geological, petrographic and hydrogeological teams worked on the Khibinskiy massif; a geological and mineralogical team and others for the study of natural gases and porous deposits went into the Lovozerskaya tundras. Other geological, geophysical and geomorphological teams studied in the Tsaginskaya depression. All work was carried out in close cooperation with teams from the SZGU of the Main Geological Prospecting Administration RSSR.

As a result of the research that was carried out, new data was obtained on the structure of the Khibinskiy and Novozerskiy plutonic rocks and their useful ores; on the copper and nickel deposits of the Pechengi and Monchi; on the mineralogy of the rare metal pegmatites of the various regions of Kola Peninsula, and the structure of the porous deposits of Lovozerskiy Rayon, the Tsaginskaya Depression and the north eastern part of Kola Peninsula. In the process of the field research work, suggestions were made to industrial geological outfits with regard to their further prospecting and exploration of useful ores.

For the first time, the Geological Institute will carry out this year expeditionary work under winter conditions. Geophysical and hydrogeological teams are making preparations for the trip.

Industrial tests were completed at the Institute of Chemistry and Technology of Mineral Ores on the technology of obtaining a high quality ferrous concentrates from the Olenogorskiy ferrous quartzites, developed under laboratory conditions in 1958. The industrial tests were conducted in cooperation with the Olenogorskiy Ores Administration on a flotation mounting with a production of 250 to 300 tons per day.

The full possibility has been shown for the introduction of flotation methods for the enrichment of various products of the existing magnetogravitational plan (residues, and industrial products from the magnetic separation) and obtaining of concentrates which contain 65 percent and more of iron and about 4.4 percent of silicon dioxide.

The extraction of iron in the concentrate fluctuates for different products on the average between 70 and 74.5 percent as a result of the operation with the starting material containing no more than 15.4 percent.

With the flotation of richer industrial products containing 46.3 percent of iron, the extraction from the operation may be raised to 96.5 percent.

As a collector which makes possible the obtaining of a high quality concentrate from products with a higher content of mica, amphiboles and pyroxenes, a soap has been suggested of a mixture of technical fish oil (20%) and distilled tallow fat (80%). Moreover, the use of this mixture makes it possible to lower or avoid the preheating of the flotation pulp and to reduce the number of purifications. The general consumption of the collector consists of 230-280 G/T of the soap and 110-115 g of sulphuric acid per ton of the initial flotation product.

Raising the content of iron and lowering the content of silicon dioxide in the concentrate of the Olenogorskiy enrichment plant, permits to considerable improvement in the technico-economic index of the work of the Cherepovets metallurgical plant.

A new sulphuric acid process has been developed for obtaining zirconium dioxide from eudialyte concentrate. Large-scale laboratory experiments were verified in which more than 100 kg of concentrate was processed with an 8.65 percent ZrO_2 content.

As a result the following scheme for obtaining zirconium dioxide from eudialyte has been indicated.

The eudialyte concentrate is decomposed by mixing with 30 percent H_2SO_4 which contains $(NH_4)_2SO_4$ until the entire mass thickens. The consumption of H_2SO_4 per kilogram of concentrate is 0.75 kg, and of $(NH_4)_2SO_4$ 0.1 kg. The degree of opening of the eudialyte is between 88 and 89

percent.

The thickened mass (gel of silica acid) dries up at a temperature of 150°C. The dried up gel is leached out with water for the extraction of zirconium in solution. The three-stage, counter-current rinsing of the silica-earth gel facilitates the extraction of 94-95 percent of zirconium. The sulphuric acid zirconium solution contains 28-30 g/l of ZrO₂.

The separation of zirconium from the solution is brought about by precipitating the hydroxide by ammonia at pH 4.9. The expenditure of ammonia (100%) on one kilogram of eudialyte concentrate is 0.09 kg. In order to change iron and manganese into the divalent state before precipitating by ammonia, the solution is reconstituted by sodium hyposulphate.

The precipitate of zirconium hydroxide is filtered off and frozen at a temperature of 12-15°C and then thawed off. Freezing helps to destroy the structure of the gel and improves the filtration properties of the precipitate. For a more complete separation of zirconium from the admixtures of iron and manganese, the reprecipitation of zirconium hydroxide is advised with subsequent freezing of the precipitate.

The product that calcined at a temperature of 800-900°C. is a technical zirconium dioxide which conforms to the requirements of MPTU 4357-53 by all its analysis, with the exception of TiO₂, the content of which is higher than the permissible norm. The total of ZrO₂ plus TiO₂ makes up 99.0 to 99.3 percent (with a content of TiO₂ from 3.7 to 3.9%).

The process developed for obtaining zirconium dioxide from eudialyte differs from those suggested earlier by a smaller expenditure of sulphuric acid, namely 8.3 tons (monohydrate) per ton of technical zirconium hydroxide, which has a content of 11.5 percent ZrO₂ in the initial concentrate.

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